

Application No. 09/843,924

REMARKS

Claims 1-32 are pending. Claims 28-30 have been withdrawn from consideration. By this Amendment, claims 9 and 10 are amended. Reconsideration based on the above amendments and following remarks is respectfully requested.

The attached Appendix includes marked-up copies of each rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

Applicant appreciates the courtesies extended to Applicants' representative by Examiners Luhrs and Lebentritt, and Supervisory Patent Examiner Elms, in the March 4, 2003, personal interview. The points discussed are incorporated into the following remarks.

I. THE CLAIMS DEFINE ALLOWABLE SUBJECT MATTER

The Office Action rejects claim 1-3, 5-8, 10, 13, 15, 17, 18, 20, 21, 25, 26, 31 and 32 under 35 U.S.C. §102(e) as unpatentable over U.S. Patent No. 6,093,964 to Saitoh (hereinafter "Saitoh"); claims 1, 5, 11, 12 and 19 under 35 U.S.C. §102(b) as unpatentable over U.S. Patent No. 5,310,699 to Chikawa et al. (hereinafter "Chikawa"); claim 9 under 35 U.S.C. §103(a) as unpatentable over Saitoh; claim 14 under 35 U.S.C. §103(a) as unpatentable over Saitoh or Chikawa in view of U.S. Patent No. 6,372,547 to Nakamura et al. (hereinafter "Nakamura"); claim 16 under 35 U.S.C. §103(a) as unpatentable over Saitoh in view of Nakamura; and claims 22-24 under 35 U.S.C. §103(a) as unpatentable over Chikawa in view of U.S. Patent No. 5,830,533 to Lin et al. (hereinafter "Lin"). These rejections are respectfully traversed.

As pointed out to Examiners Luhrs, Lebentritt and Elms at the March 4 personal interview, neither Saitoh nor Chikawa disclose, teach or suggest a method for forming a bump, or a semiconductor device manufactured by a method for forming a bump, comprising the sequence of fabrication steps claimed in independent claim 1. As disclosed in the specification, at page 1, lines 31-32, the method recited in claim 1 allows the bump to be

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formed by a simplified step. Further, as disclosed in the specification, at page 9, lines 19-23, exposing at least a part of each pad 12 from the insulating film 14 and forming a bump on the pad 12 can be performed using the same resist layer 20. Thus, these steps can be performed using the same resist layer 20 formed for the first step, without forming resist layers 20 repeatedly.

In contrast, Saitoh, at col. 4, lines 7-11 and 27-40, and in Figs. 3-5, discloses that an additional metal film 5, comprising a plurality of metal layers, is formed on the surface of the electrode 3 and the insulating layer (undesigned) formed on the semiconductor chip 1. According to Saitoh, a photoresist layer 7 is next applied over metal layer 5, and then the photoresist layer 7 on top of electrode 3 is opened to allow a gold layer 13 and an indium layer 15 to be formed on top of the metal layer 5. The fabrication steps for forming a bump, as well as the semiconductor bump configuration /arrangement disclosed in Saitoh, are different than the claimed invention.

Furthermore, unlike the claimed invention, as claimed in claim 1, Chikawa, at col. 2, lines 37-66, col. 3, line 63 to col. 4, line 50, and in Figs. 2A-2E, discloses a semiconductor substrate 1 on which an insulative layer 2 is formed, an electrode 3 being on the insulative layer 2. A passivation layer 4 of phospho-silicate glass is then formed over the surface of the electrode 3 and insulative layer 2. A multi-layer metal film 6 is next formed over the whole surface of the semiconductor chip. Then, the multi-layer film 6 is masked by a photoresist layer 9, excluding the section where a bump electrode 7 is formed with a metal. As with Saitoh, the fabrication steps for forming a bump, as well as the semiconductor bump configuration /arrangement disclosed in Chikawa, are different than the claimed invention.

Claims 2-27 and 31-32 depend from independent claim 1.

Further, neither Nakamura nor Lin makes up for the deficiencies of Saitoh or Chikawa.

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For at least these reasons, it is respectfully submitted that independent claim 1 distinguishes over Saitoh and Chikawa. Claims 2-27 and 31-32, which depend from independent claim 1, also are patentable over the applied art for at least the reasons discussed above as well as for the additional features they recite. Applicants respectfully request that the rejections under 35 U.S.C. §102(b), §102(e) and §103(a) be withdrawn.

II. CONCLUSION

For at least the reasons discussed above, it is respectfully submitted that this application is in condition for allowance.

Should the Examiner believe that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,



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Attachment:
Appendix

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<p>DEPOSIT ACCOUNT USE AUTHORIZATION Please grant any extension necessary for entry; Charge any fee due to our Deposit Account No. 15-0461</p>

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APPENDIX

Changes to Claims:

The following is a marked-up version of the amended claim 1:

1. (Amended) A method for forming a bump, comprising:
~~forming an opening in an insulating film which exposes at least a part of a pad;~~
~~forming a bump connected to the pad;~~
forming a resist layer that defines a through hole which overlaps at least a portion of the ~~a~~ pad;
forming an opening in an insulating film after forming the resist layer, the opening exposing at least a part of the pad; and
forming a metal layer after forming the opening, the metal layer connected to the portion of the pad exposed at the opening; and
forming a bump connected to the pad after forming the metal layer.